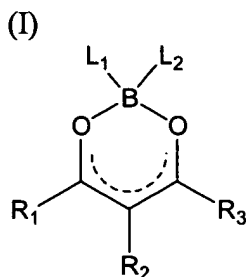


WHAT IS CLAIMED IS:

1. A composition comprising a polydioxaborine and an NLO chromophore.
2. The composition of Claim 1 that is photoconductive.
3. The composition of Claim 2 that is photorefractive.
4. The composition of Claim 1 in which the polydioxaborine comprises a dioxaborine group of the formula (I):



wherein R_1 , R_2 , R_3 , L_1 and L_2 are each independently selected from the group consisting of hydrogen, linking atom, electron withdrawing group, and electron donating group.

5. The composition of Claim 4 in which R_1 , R_2 , R_3 , L_1 and L_2 are each independently selected from the group consisting of a hydrogen atom, a linking atom, C_1 - C_{10} alkyl, and C_6 - C_{10} aryl.

6. The composition of Claim 4, in which

L_1 and L_2 are each independently selected from the group consisting of hydrogen, linking atom, halogen, C_1 - C_6 alkyl, C_1 - C_6 alkoxy, C_1 - C_6 thioalkyl, nitrile, and a bridging ligand formed by L_1 and L_2 together;

R_1 and R_3 are each independently selected from the group consisting of hydrogen, linking atom, carboxylate, carboxylic acid, aldehyde, amide, epoxy, acid chloride, anhydride, nitrile, sulfonate, sulfonic acid, phosphonate, nitrate, nitro, C_1 - C_{18} alkoxy, C_1 - C_{18} alkyl, C_1 - C_{18} fluoroalkyl, hydroxyl, C_{12} - C_{20} diarylamino, C_2 - C_{10} dialkylamino, C_1 - C_6 alkylhalide, C_1 - C_6 nitroalkyl, C_1 - C_6 alkanoic acid, C_1 - C_6 alkylamide, C_6 - C_{10} aryl, C_6 - C_{10} aryloxy, C_7 - C_{20} alkylaryl, and C_7 - C_{20} alkylaryloxy; and

R_2 is selected from the group consisting of hydrogen, linking atom, carboxylate, carboxylic acid, aldehyde, amide, epoxy, acid chloride, anhydride, nitrile,

sulfonate, sulfonic acid, phosphonate, nitrate, nitro, C₁-C₁₈ alkoxy, C₁-C₁₈ alkyl, C₁-C₁₈ fluoroalkyl, C₁₂-C₂₀ diarylamino, C₁-C₆ alkylhalide, C₁-C₆ nitroalkyl, C₁-C₆ alkanoic acid, C₁-C₆ alkylamide, C₇-C₂₀ alkylaryl, and C₇-C₂₀ alkylaryloxy.

7. The composition of Claim 4 in which the linking atom is selected from the group consisting of carbon atom, nitrogen atom, oxygen atom, and sulfur atom.

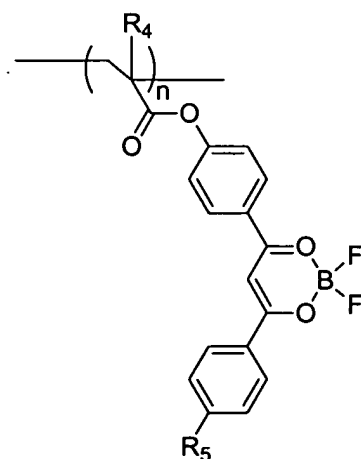
8. The composition of Claim 4 in which L₁ and L₂ are each independently a halogen selected from the group consisting of fluoro, chloro, and bromo; R₁ is a linking atom, R₂ is hydrogen, and R₃ is selected from the group consisting of hydrogen, C₁-C₁₈ alkyl, C₁-C₁₈ alkoxy, C₆-C₁₀ aryl, C₆-C₁₀ aryloxy, C₇-C₂₀ alkylaryl, and C₇-C₂₀ alkylaryloxy.

9. The composition of Claim 4 in which only one of R₁, R₂, R₃, L₁ and L₂ is a linking atom.

10. The composition of Claim 4 in which two of R₁, R₂, R₃, L₁ and L₂ are linking atoms.

11. The composition of Claim 1 in which the polydioxaborine comprises a recurring unit of the formula (II)

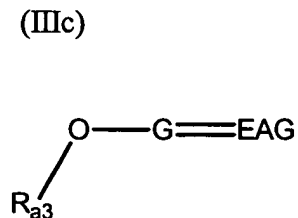
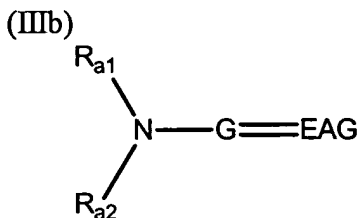
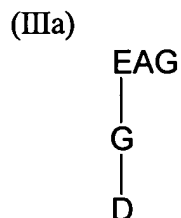
(II)



in which R₄ and R₅ are each independently selected from the group consisting of a hydrogen atom, C₁-C₁₀ alkyl, and C₆ - C₁₀ aryl.

12. The composition of Claim 1 in which the NLO chromophore has a photorefractive figure of merit of about 1×10^{-49} esu or greater.

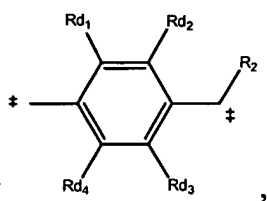
13. The composition of Claim 12 in which the NLO chromophore is a compound having a formula selected from the group consisting of formula (IIIa), formula (IIIb), and formula (IIIc):



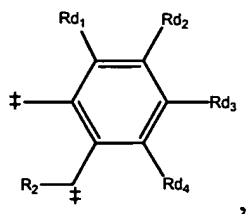
in which R_{a1} , R_{a2} , and R_{a3} are each individually selected from the group consisting of a hydrogen atom, C_1 - C_{10} alkyl, and C_6 - C_{10} aryl; G is a π -conjugated bridge; D is an electron donating group; and EAG is an electron acceptor group.

14. The composition of Claim 13 in which G is represented by a structure selected from the group consisting of an alkene, a 1,3-diene, a 1,3,5 triene, a structure of the formula (V), a structure of the formula (VI), and a structure of the formula (VII);

(V)

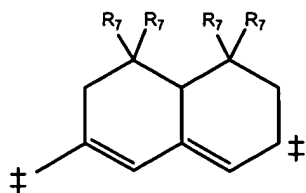


(VI)



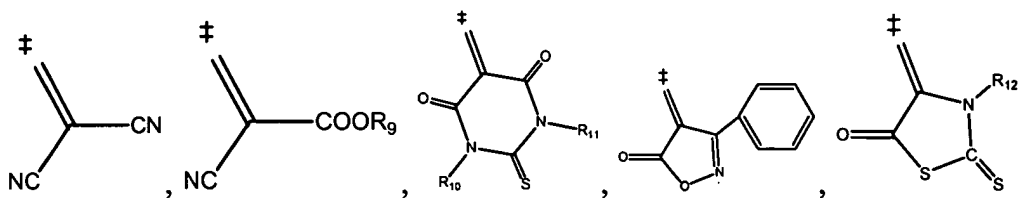
wherein Rd_1 - Rd_4 are each independently selected from the group consisting of a hydrogen atom, C_1 - C_{10} alkyl, and C_6 - C_{10} aryl;

(VII)



wherein each R₇ individually represents H or C₁-C₁₀ alkyl; and

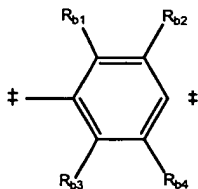
wherein EAG is an electron acceptor group represented by a structure selected from the group consisting of



wherein R₉, R₁₀, R₁₁, and R₁₂ are each independently selected from the group consisting of a hydrogen atom, C₁-C₁₀ alkyl, and C₆ - C₁₀ aryl.

15. The composition of Claim 13 in which G in formula (IIIa) is represented by the formula (VIII):

(VIII)



wherein EAG is selected from the group consisting of SO₃R₁₃, NO₂, C(O)OR₁₃, SO₂R₁₃, S(O)R₁₃, C(O)R₁₃, CN, and C(O)NR₁₄R₁₅, in which C(O) represents a carbonyl group and S(O) represents a sulfoxide group; and

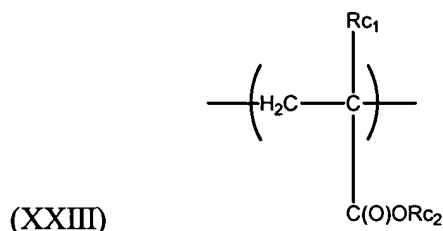
wherein R_{b1}, R_{b2}, R_{b3}, R_{b4}, R_{b5}, R₁₃, R₁₄, and R₁₅ are each independently selected from the group consisting of a hydrogen atom, C₁-C₁₀ alkyl, and C₆ - C₁₀ aryl.

16. The composition of Claim 14 in which the NLO chromophore is (4-(homopiperidinyl)benzylidene)malonitrile.

17. The composition of Claim 12 in which the NLO chromophore is covalently bonded to the polydioxaborine.

18. The composition of Claim 1 in which the polydioxaborine comprises a plasticizing recurring unit.

19. The composition of Claim 18 in which the plasticizing recurring unit is represented by the formula (XXIII):



wherein Rc₁ and Rc₂ are independently selected from the group consisting of C₁-C₁₀ alkyl and C₁ - C₁₀ alkenyl.

20. The composition of Claim 19 in which (XXIII) is selected from the group consisting of 2-ethylhexylacrylate, butylacrylate, and butylmethacrylate.

21. The composition of Claim 20 having a glass transition temperature of about 100° C or less.

22. A composition comprising a polydioxaborine, an NLO chromophore and a photosensitizer.

23. The composition of Claim 22 in which the photosensitizer is a charge-transfer complex.

24. The composition of Claim 23 in which the charge-transfer is formed between at least a part of the NLO chromophore and the polydioxaborine.